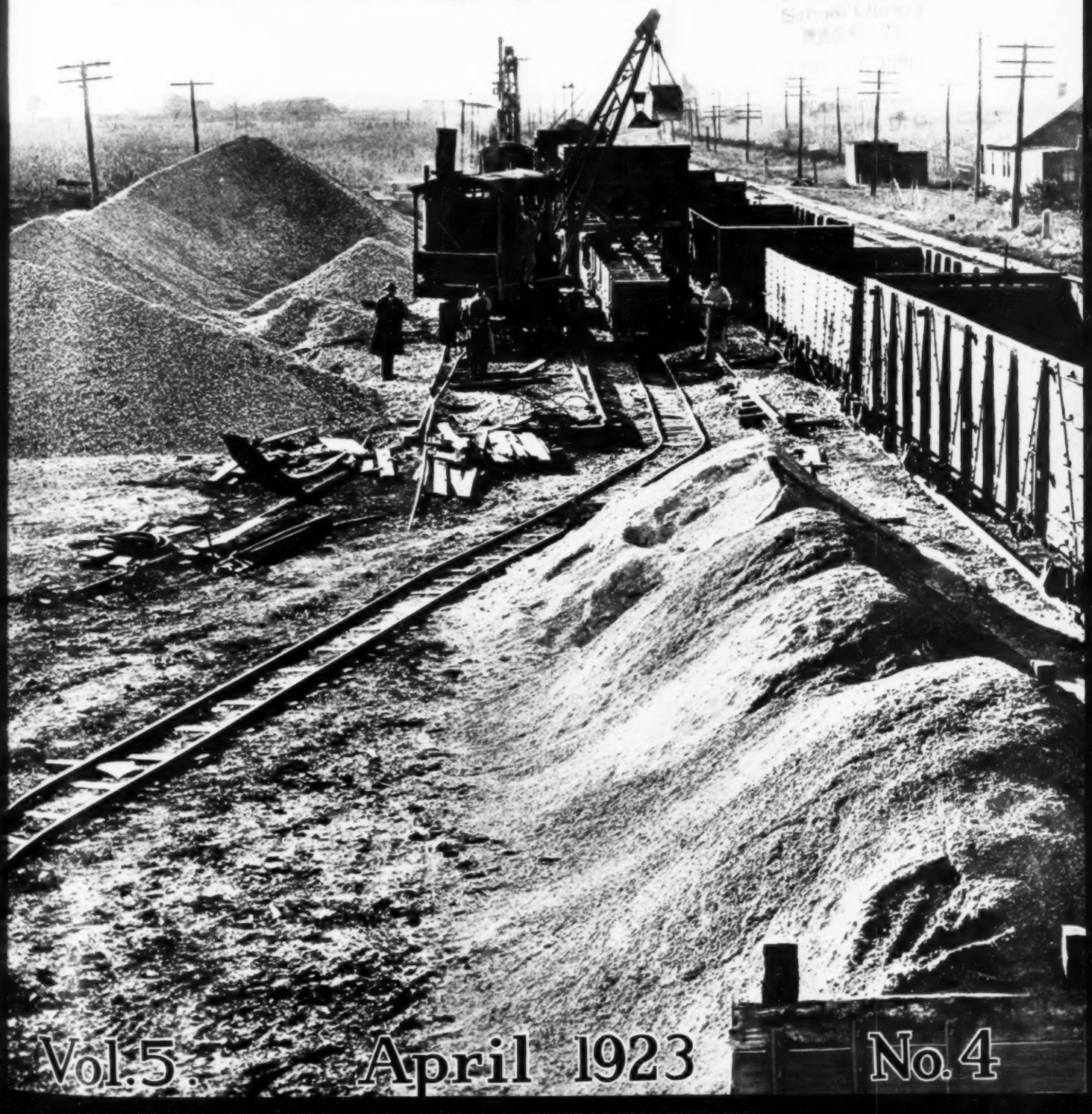
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining



Vol. 5 April 1923 No. 4

Upholding the Business End

The best boom that can be designed, backed by the most efficient engines and operating mechanism must be mounted on the right truck if your shovel is to accomplish all you expect it to.

Compare other continuous treads with the Thew. You will want to pay special attention to three features, the power steer, the two speeds and the flexibility.

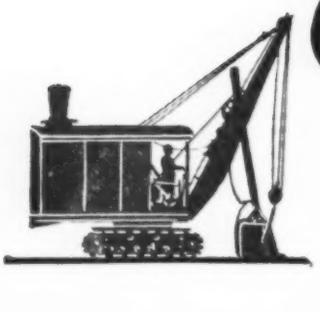
The Thew power steer is operated by the man in the cab. He simply kicks a foot lever, swings the boom a little and follows it around. No chains to hook up. No steam lines to connect. Quick, easy and effective.

The Thew has two speeds. One of 42′ a minute for climbing, soft earth, mud or tough going of any sort. One of 65′ a minute for level traveling and easy going. At low speed the Thew moves through or over anything and has been known to negotiate a 40% grade under its own power. All gears beneath the truck have steel covers.

The Thew combines the good points of flexible and rigid designs without the evils of either. A swivel device on the front axle and tread frames keeps the traction even and uniform and the house level even when one tread is going over a timber, rock or other obstacle.

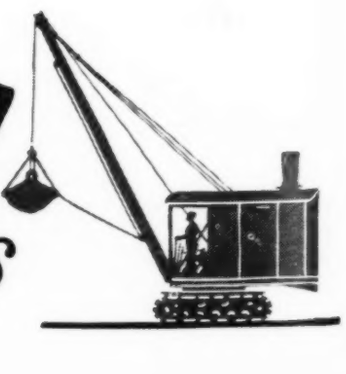
The third folder of a series on shovel construction is being mailed this month. This one covers trucks. When writing ask for 323.

THE THEW SHOVEL COMPANY, LORAIN, O.



Thew

Power Shovels



Successful Methods

A Magazine of Construction Service

Published by SUCCESSFUL METHODS, Inc.
F. A. SMYTHE, President
S. T. HENRY, Vice-President and Treasurer WILLIAM JABINE, Secretary and Editorial Director
141 Centre St., New York City, N. Y.

Vol. 5 APRIL, 1923 No. 4

The Cement Supply

VARIOUS fantastic stories about a serious shortage of Portland cement have been going the rounds of the daily press. One newspaper reporter evidently wrote something based on somewhere near the facts about the tremendous shipments of cement st year. Another reporter rewrote the story and essed there would be a shortage. It was not long ntil some of the so-called experts of the daily press had the whole 1923 construction program held up for lack of cement.

The facts are that there should be no Portland cement shortage in 1923 unless there are unforeseen labor, fuel or transportation difficulties. Cement producers are confident that their output will meet the demand. Their reasoning is based on figures that appear sound.

Last year's cement shipments were only about 80 per cent of the cement manufacturing capacity of the country. Since then mill capacity has been increased about 4,000,000 barrels. Requirements for 1923 are not believed to exceed 125,000,000 barrels, while the annual mill capacity is now close to 150,000,000 barrels. Besides, in January and February of this year total production was 15,789,000 barrels, or an increase of 84 per cent over 1922 production for the same two months. Production always is lower in the winter. The outlook for continuing to show a big increase in production this year also is excellent.

Shipments in January and February this year were 11,382,000 barrels or an increase of 83 per cent over these months last year. Some of this increase was due to greater building activity this year. Much of it was traceable to forehanded buying of big and little consumers.

At the moment, the cement mills appear better able o take care of their customers on deliveries than do he producers of many other kinds of construction materials. As a matter of fact, it appears now that a shortage of sand, gravel and broken stone will occur in many parts of the country. The lack of these materials last year had far more to do with holding up construction work than did the failure of users to get cement.

The chief trouble in the cement situation is that the average consumer expects his deliveries to arrive just about at the rate of his consumption. Even though the mills and their distributors are ready to meet the situation brought about by such a short-sighted buying policy, the railroads lack the facilities to deliver on this basis. So if some jobs are shut down later due to shortage of cement, the blame can very probably be laid pretty close to the job itself.

The Fresno in the East

DIRT movers west of "the river" use the fresno very effectively on short-haul work. In fact, the fresno is the standard tool with them for such work. In the East, however, the fresno has until recently been almost unknown. Many Eastern contractors even yet have not seen one outside of a catalog. Those few who have used fresnos on work for which this type of scraper is adapted have been fully converted to the fact that it is not a tool suitable for use in the West only. In fact, the fresno has come into its own in a surprising way around Philadelphia.

The elevating grader has had a similar history. This wonderfully efficient machine was developed largely on big railroad, levee, drainage and irrigation jobs west of "the river." It is almost as widely used now in the Middle West and the South as in the plain States and beyond. Occasionally, a Western dirt-mover who has drifted East on a job has shown that geography does not affect the remarkable capacity of this type of excavator and loader on work for which it is adapted.

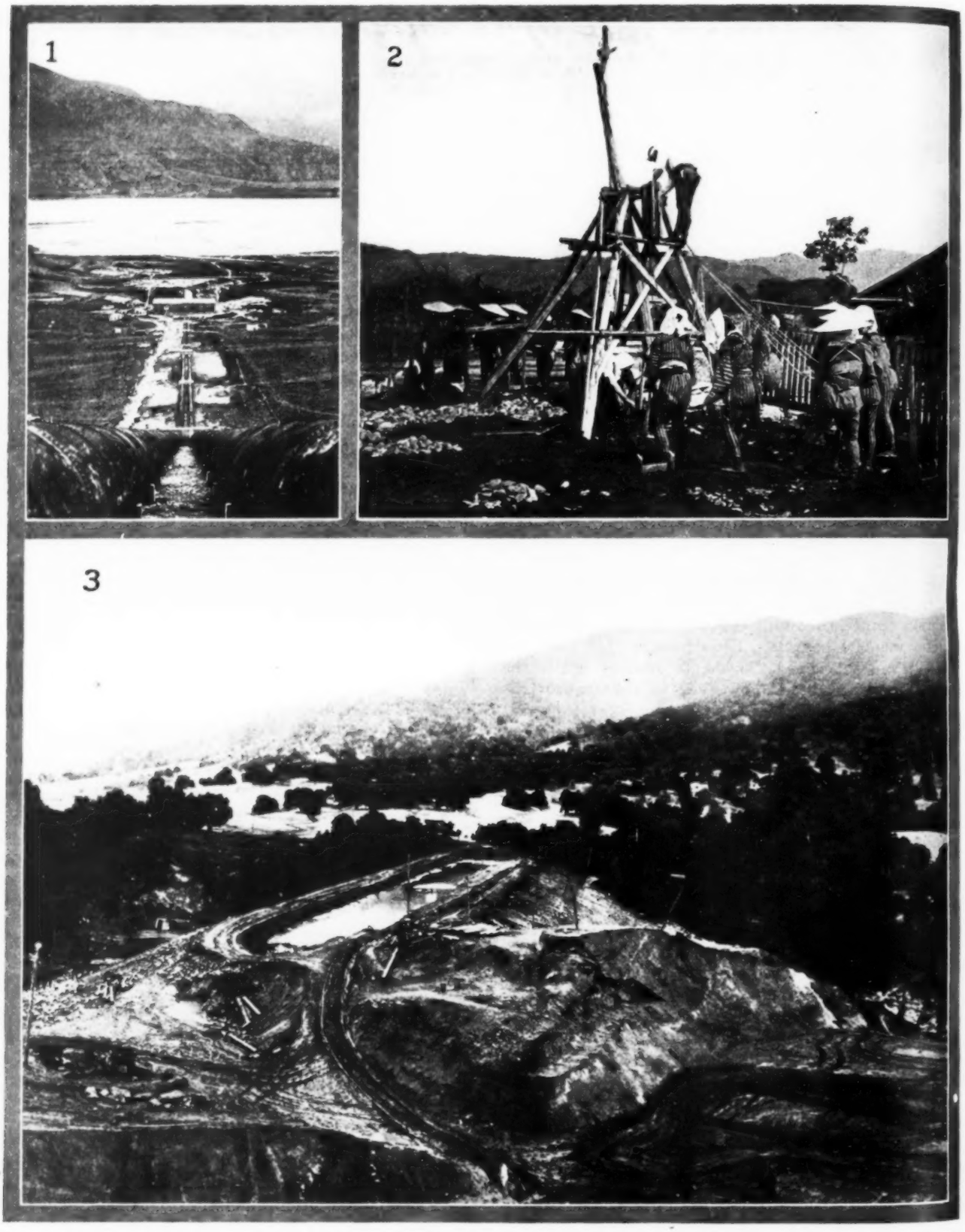
Similarly, the concrete road finishing machine, the subgrader and the grade rooter have come out of the West. The finisher is probably used more widely in the East now than in any other section. The subgrader and the grade rooter have been slower to take hold, but will apparently come into their own this season.

Just why construction men in the East hesitate to take up a new tool or machine is a question. It may be because the average westerner will take a chance quicker than the average easterner. Any way, it frequently is the case that equipment that has become standard in the West is often very slowly adopted in the more conservative East.

Free to Men Who Can Use It

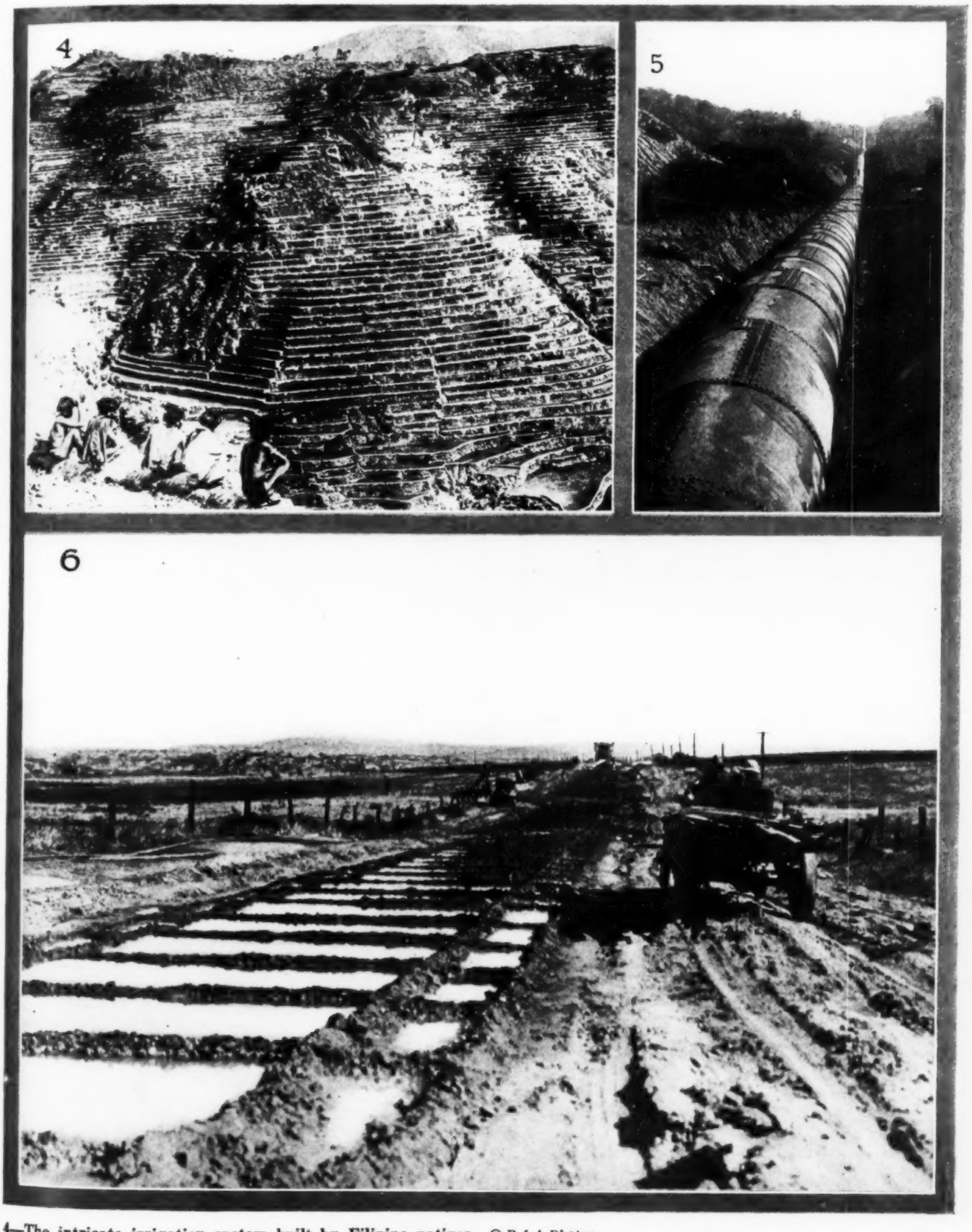
THIS magazine goes monthly, free of charge, to 40,000 readers engaged in various branches of the great construction industry. Contractors, engineers and others identified with construction work who desire to receive SUCCESSFUL METHODS will be placed on the mailing list upon request.

Water Does Work



1—The biggest hydro-electric station in New Zealand. The great penstocks at Lake Coleridge with the power house in the distance. © *Keystone.*
2—A dozen women are needed to operate this Japanese well digger. © *Keystone.*
3—Earth dam in California built by filling core with clay pumped in by hydraulic jets. © *International.*

And Makes Work



4—The intricate irrigation system built by Filipino natives. © *P & A Photos.*
5—A section of the great pipe which brings the Catskill water to New York City. © *International*
6—Water helping to build a concrete road. The ponding method of curing is popular. © *International.*

BUILDING THE IDEAL SECTION OF THE LINCOLN HIGHWAY

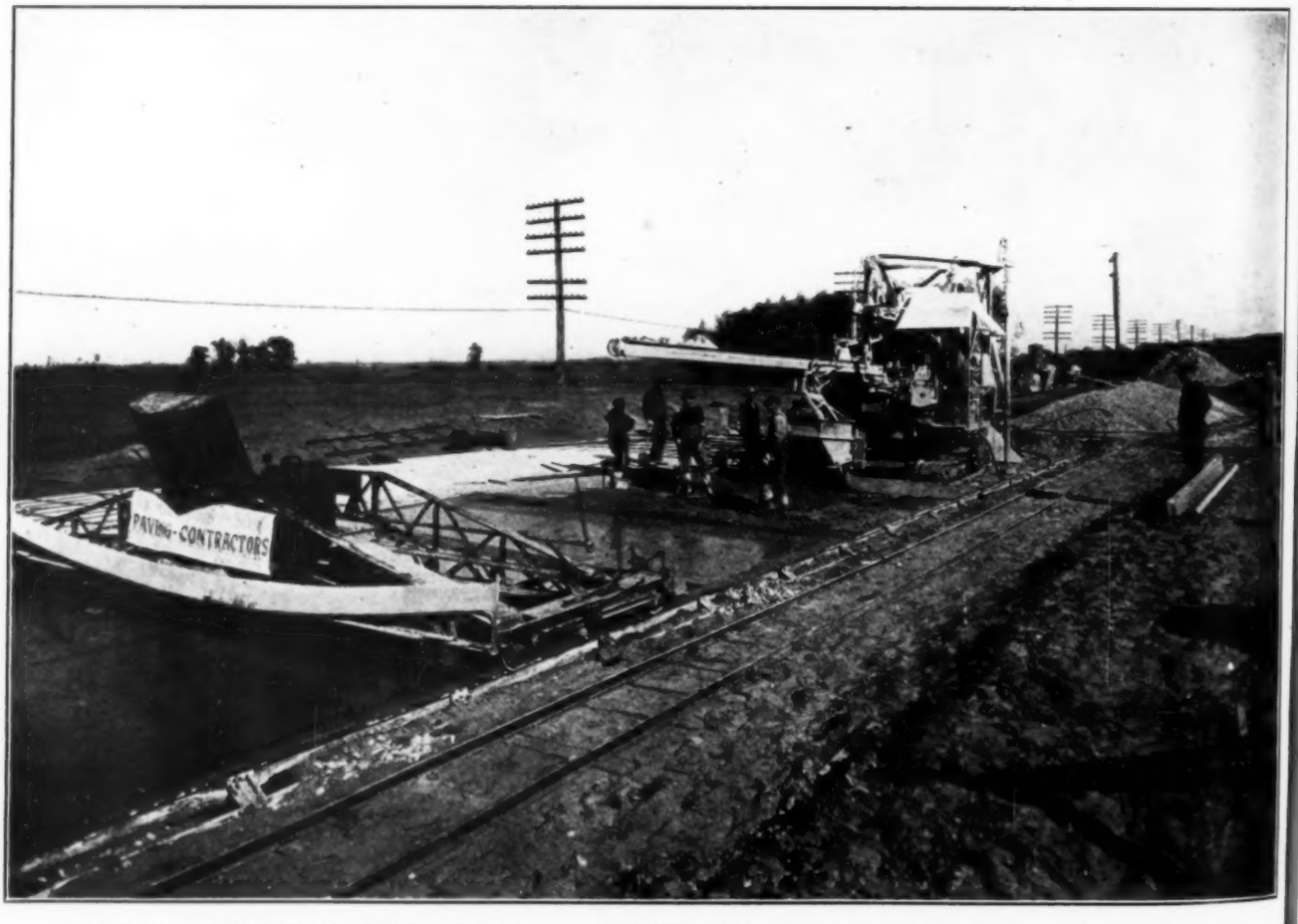
Some of the Methods Used in Construction of 40 ft. Wide Concrete Road

THE methods used for the construction of the Ideal Section of the Lincoln Highway at Dyer, Ind., 8 mi. south of Gary, are of great interest to contractors and engineers engaged in highway work. This 1½-mi. section of concrete road which was completed last fall is 40 ft. in width and is designed to carry a traffic averaging 15,000 passenger automobiles every 24 hr. traveling at an average speed of 25 mi. per hour and 5,000 motor trucks traveling at a speed of 10 mi. per hour. In order to perform this work efficiently arrangements have been made to separate freight and passenger traffic, the 40-ft. road providing for 4 lanes.

J. C. O'Connor & Sons of Fort Wayne, Ind., did the actual building of the Ideal Section, and the photographs which accompany this article were taken during the progress of the work. As may be seen from these photographs it was decided to build the road in two 20-ft. slabs with a longitudinal joint between which necessitated certain changes in some of the machinery used.

No material was permitted on the subgrade and the industrial haulage system for bringing materials to the mixer was adopted. At the railroad siding which is shown on the cover of this issue of SUCCESSFUL METHODS, two locomotive cranes handled the gravel and sand from the railroad cars to the stock bins and from them into the movable bins under which was narrow-gage track. Steel batch boxes of the tipover type were used provided with the usual three compartments for sand, stone and cement, properly proportioned. These boxes were unloaded at the central proportioning plant and hauled to the job over the narrow-gage track by 6-ton gasoline locomotives. Each train consisted of 12 cars, each of which carried two loaded batch boxes.

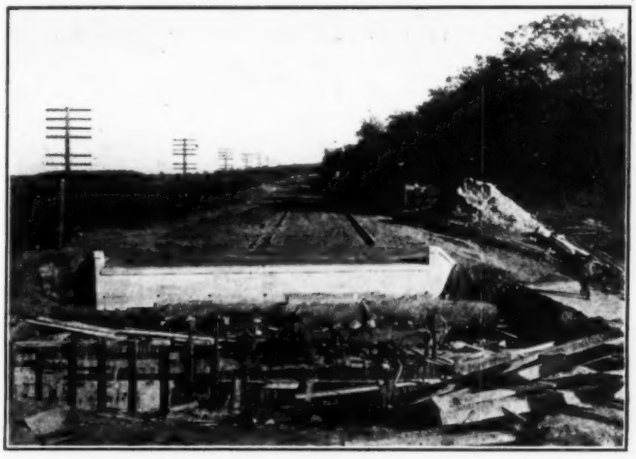
A finishing machine was used at this work and the fact that the road was built one-half of its width at a time necessitated slight alterations on this machine when the time came to finish the second half of the road. On the first 20-ft. slab, the finisher was used just as it would be on any other 20-ft. road. On the second half, however, a special set of flat tread wheels was fitted to the machine on the side which travelled on the finished concrete. On the outside edge where the machine travelled on the forms, double flanged wheels were used. It was thought at first that some difficulty might be experienced with the flat tread wheels which had to run on the finished con-



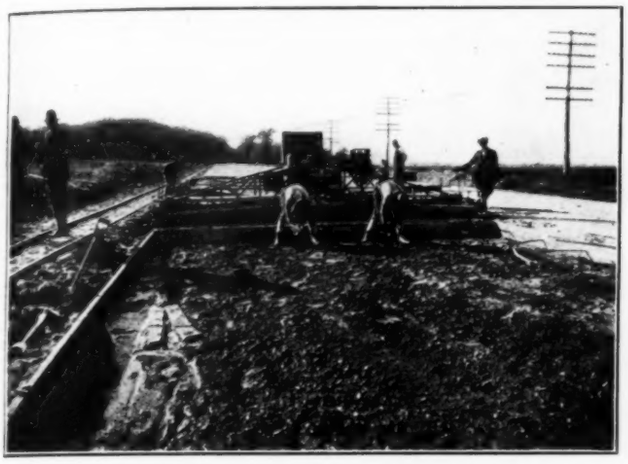
PAVER AND FINISHING MACHINE AT WORK ON SECOND HALF OF IDEAL SECTION OF LINCOLN HIGHWAY

crete surface because they might not have traction enough, or the slab itself might not be quite true enough to serve as a guide for the wheel. These fears proved groundless in actual practice as the machine travelled along smoothly spreading, tamping and surfacing with the same efficiency as on the first half of the road.

This method of using a finishing machine on half-width roads is interesting to contractors in those states which are adopting the principle of building concrete roads one-half width at a time in order to keep the other half of the road open for traffic. The latest specifications for New York state, for example, which are described on Page 14 of this issue provide for building roads in this manner.

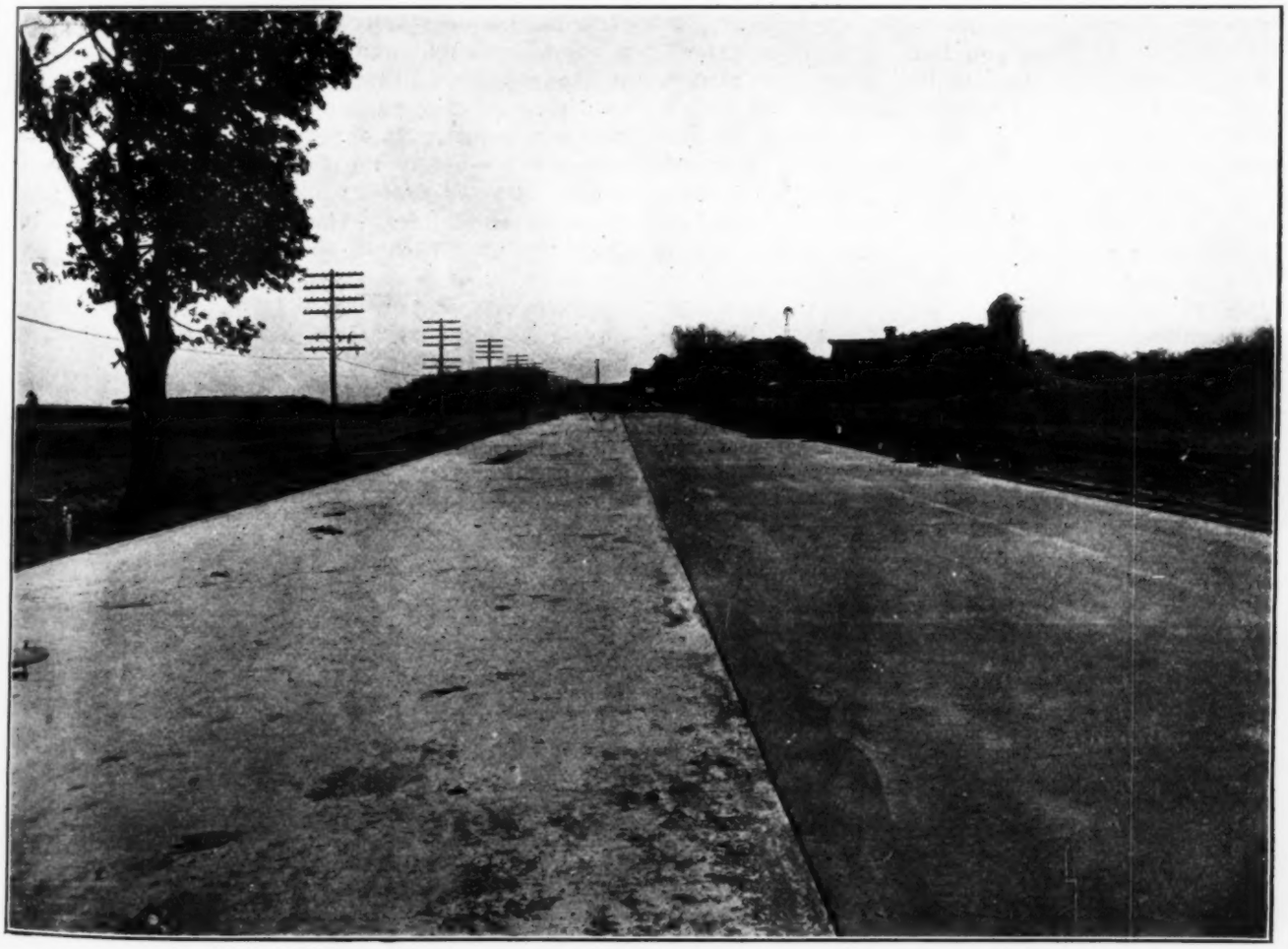


THE SUBGRADE READY FOR THE CONCRETE ABUTMENT OF ONE OF THE BRIDGES IN THE FOREGROUND



PUTTING IN DOWEL WHICH TIES TOGETHER THE TWO 20-FT. SLABS

The two slabs in which the pavement was built are tied together with steel dowels and one of the small photographs on this page shows two workmen putting these steel dowels in place on the end of a finished slab. These steel dowels are ¾ in. by 5 ft.



A SECTION OF THE ROAD LOOKING EAST AFTER BOTH SLABS HAD BEEN LAID BUT BEFORE THE SECOND SLAB WAS CLEANED UP

MAKING GRAVEL COME TO THE PLANT

Dam Keeps River Bed Clean and Collects Constant Supply of Valuable Material

By Ivan E. Houk
City Engineer, Dayton, Ohio

A RATHER novel method which turns necessity into profits, is being used by the Miami Conservancy District in keeping the channel of the Miami River at Hamilton, Ohio, free from gravel. In this section of the country, where the stream beds are composed of glacial deposits, gravel always moves downstream along the bottom of the river during flood periods, forming bars here and there, and leaving pools between. In order to keep gravel from entering the newly improved channel at Hamilton, the District built a low concrete dam across the river near the upper edge of the city, forming an artificial settling basin in which the gravel is caught. Arrangements were then made with a local gravel company to keep this basin empty by taking its supply of gravel from the river at this place. This method of assuring a constantly replenished supply of gravel is one which might well be worked out in other parts of the country. The gravel plant is now working and is performing more efficient service to the construction industry in the vicinity of Hamilton than was possible before the construction of the dam.

Both dam and gravel plant are now completed and operating as planned. The crest of the dam is 5 ft. above low water elevation. The dam has on ogee cross-section with an apron about 8 ft. wide on the upstream side, and one about 14 ft. wide on the downstream side. Scour below the downstream apron is

THE TWO PHOTOGRAPHS SHOW THE CONSTRUCTION WORK ON THE DAM. THE GRAVEL PLANT MAY BE SEEN IN THE BACK OF THE UPPER PICTURE

prevented by a flexible concrete block mattress 40 ft. wide, made of blocks 2 ft. wide, 1 ft. long, and 5 in. thick, tied together by steel cables. Two cables pass transversely through each block, and the blocks are staggered so that they form a continuous yet flexible mat. Steel sheet piling was driven along the edge of the upstream apron, and timber piles along the edge of the downstream apron. Cables from the concrete blocks were tied to the toe of the downstream apron.

The accompanying photographs show the dam in the course of construction. The upper view shows the gravel plant in the background. A dragline was used in making the necessary excavation for the foundation, in driving piles, and in building cofferdams around the different sections of the dam. The cofferdams were huge enclosures, formed by gravel levees rather than by steel or timber piling. The water within them was kept down by means of an 8-in. centrifugal pump.

Five gaps, 24 ft. long, separated by sections 30 ft. long, were left in the first section of the dam, to carry the river flow while the remaining portion was being built. These were filled in one by one. The dam was built last fall when the water was comparatively low and when practically all of the flow was being diverted through a big manufacturing plant. In fact, when the last gap was closed it required 60 hours for the water surface to rise to the crest of the dam.

The concrete mixer was located on the bank and the concrete transported to the forms in cars hauled over narrow gage tracks by gasoline locomotives, except in the case of the abutments and the end walls for the concrete block mat where wheel-barrows were used.

The work was done by the forces of the District under C. H. Eiffert, division engineer, and W. T. Rains, superintendent. Chas. H. Paul is chief engineer and C. H. Locker is constrution manager.

TRUCKING CONTRACTOR HELPS SHIPPERS

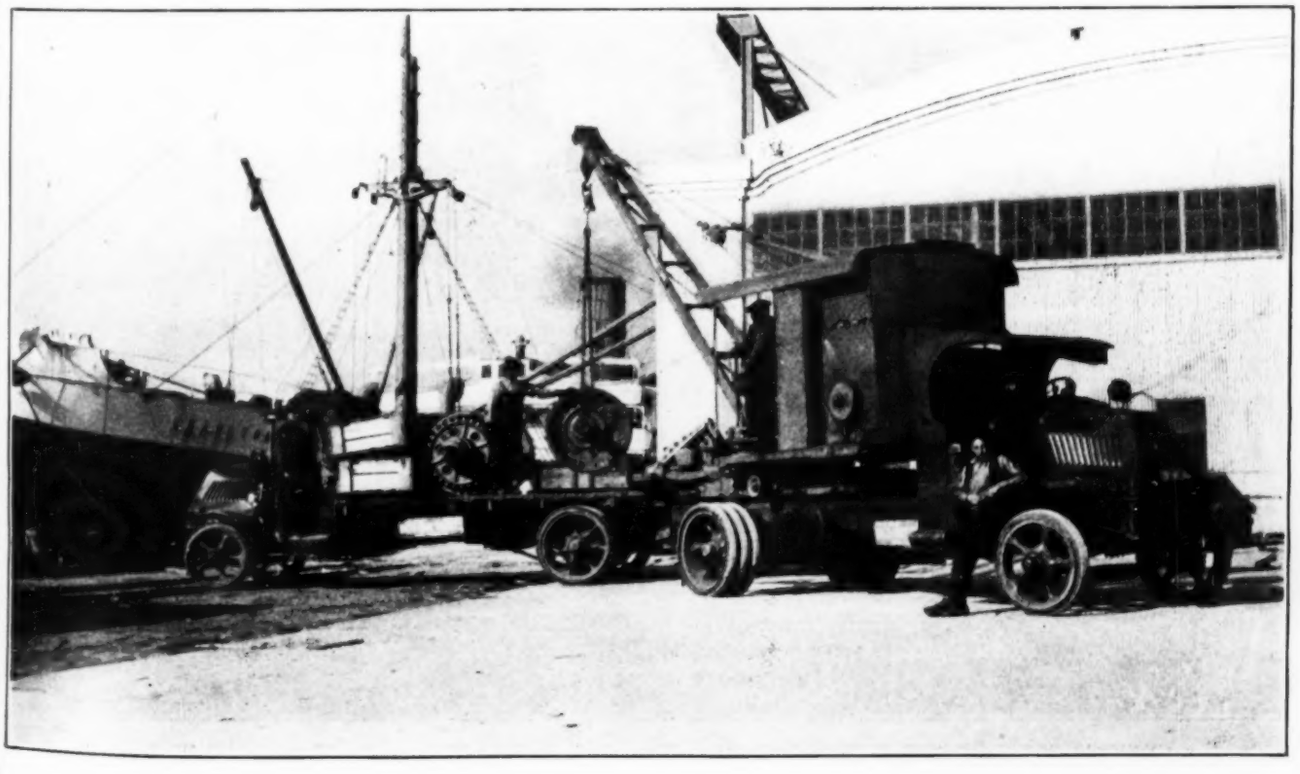
Mobile Crane Handles Heavy Jobs on Los Angeles Docks and Relieves Congestion

A LOS ANGELES truck contractor has speeded up his work to a remarkable extent by the use of a crane mounted on a motor truck which he can move quickly from place to place. Recently there was considerable congestion on the docks at Los Angeles and this crane owned by the Smith Brothers Truck Company made quick work of several jobs, which at the start looked like long drawn out affairs.

It was put to work at first loading pipe into railroad cars and handling three 20-ft. lengths of pipe each weighing about 1100 lb. simultaneously. Two men on the ground, two on the car and the crane operator handled 50 tons of this pipe in two hours, a job that under the old conditions would have taken 15 men about 6 hours to do.

The photograph at the bottom of this page shows the crane in action on one of the docks loading a motor truck with heavy castings.

On another occasion it was moved to three different points, a mile apart and loaded trucks with sheet metal, each piece of which weighed about 3 tons. This performance was done inside of an hour.

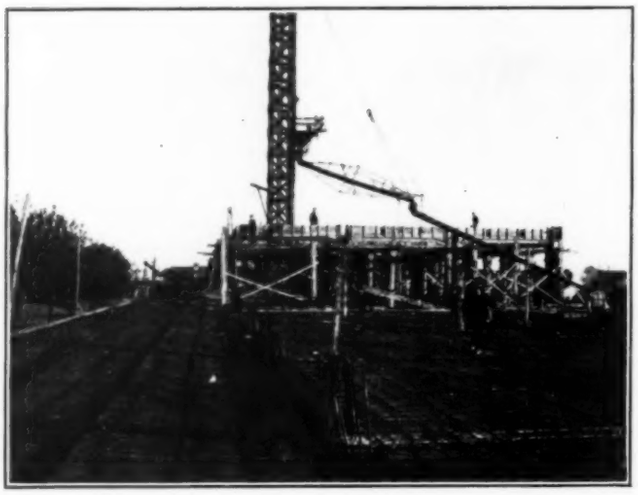


SPANIARDS SPEED CONSTRUCTION JOB

Complete Freight Station in Barcelona Four Months Ahead of Time—American Mixers and Chuting Plant Used

By Chester Cotten

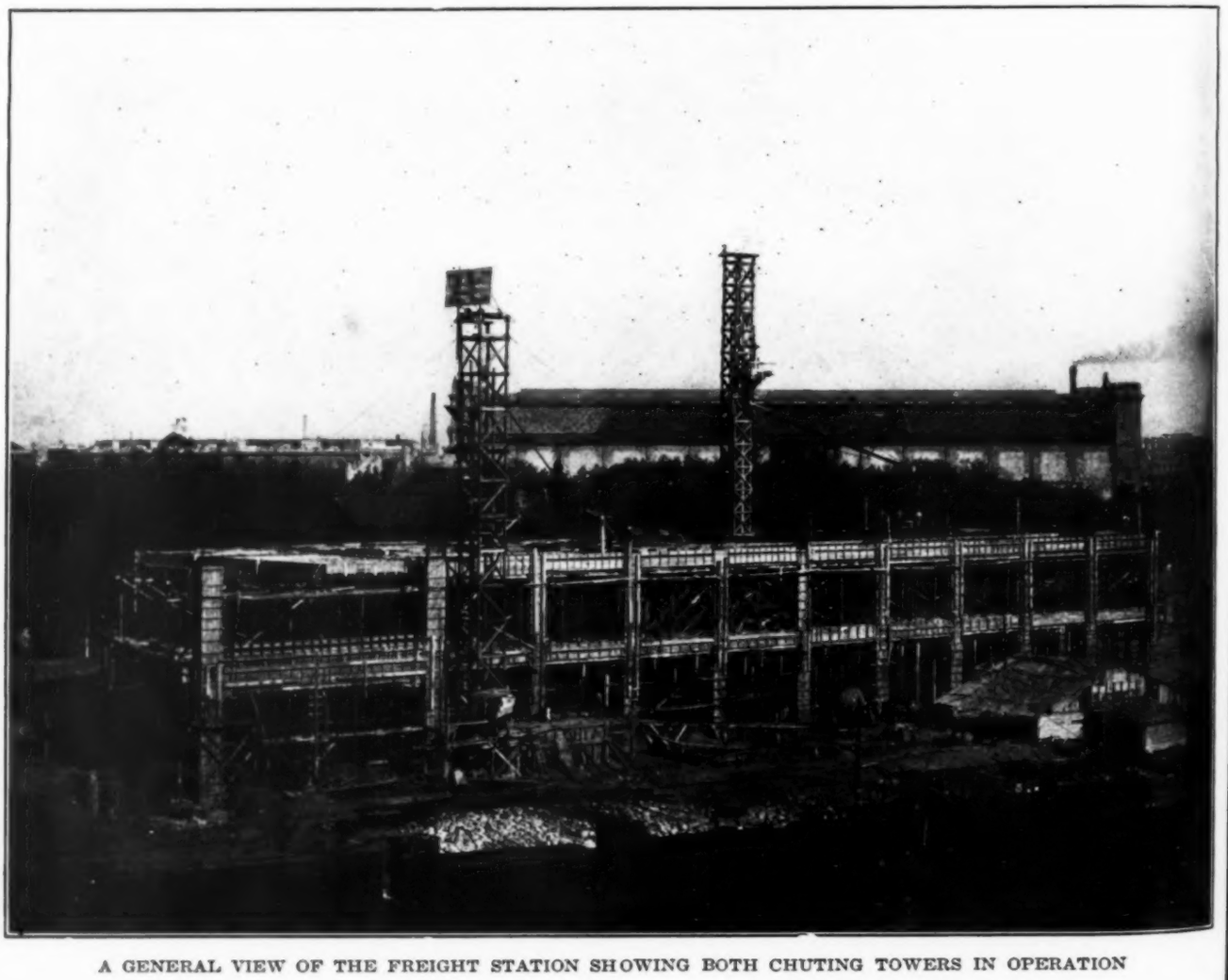
THE prevailing theory that Spaniards are procrastinators and that their favorite answer when asked to get to work is "Mañana," seems to be emphatically refuted by the record made on the construction of a railroad freight station in Barcelona, photographs of which accompany this article, and when the statement is added that work was begun May 15, 1922, and the building completed Dec. 25, 1922, four months ahead of the time stipulated in the contract, it is clear that the Spanish builders have every reason to be proud of the job.



POURING ONE OF THE FLOORS—THE REINFORCING IN PLACE

A few figures will show the magnitude of the work and the speed with which it was done.

The necessary excavation consisted of 6540 cu. yd., of which 1046 cu. yd. was under water work. There were some old city walls in the way which had to be pulled down, this job necessitating the removal of 228 cu. yd. of material above water and 32 cu. yd. under water.



A GENERAL VIEW OF THE FREIGHT STATION SHOWING BOTH CHUTING TOWERS IN OPERATION

Altogether 6147 cu. yd. of concrete were placed, 1242 cu. yd. under water, 1635 cu. yd. faced with brick and 3270 cu. yd. reinforced.

The material used was 210 tons of round bars, 925 tons of Ashland cement and 215 tons of slow cement. The forms for the reinforced concrete required 16,744 sq. yd. of material and those for the brick faced concrete required 1794 sq. yd.

The area of each floor is 1734 sq. yd. with an expansion joint in the center and each floor was poured in one day. The average number of men on the job was 170 and the total cost was 950,000 pesetas, which in United States money would be about $147,000.

American machinery had a share in this excellent performance as the chuting plants and the two mixers used on the job were built in this country. They did their work in satisfactory fashion.

BUILDING NEARING COMPLETION

LAKE MAKING IN A CITY PARK

Steam Shovel Works Well in Spite of Precarious Footing

MAKING lakes with a steam shovel is not altogether an easy task, especially when the lakes are in a park where the preservation of every fine tree is a matter of paramount importance. Miller Brothers & Co. of Bloomfield, Conn., tackled such a proposition for the City of New Britain recently, and in spite of the unusual nature of the work and the great care that was required made a complete success of it.

The two photographs which accompany this article show the character of the material in which the shovel worked. About 70,000 cu. yd. of dirt had to be moved in order to make the chain of small lakes with connecting canals that the landscape architects had planned. At times the water was 6 in. deep over the mats on which the shovel stood and frequently the footing was anything but secure. The shovel kept at its work in spite of this condition.

Preserving every tree possible complicated things considerably and the shovel had to do some twisting and turning that ordinarily does not occur on a shovel job. The wagons in which the earth was removed also had their troubles in getting close enough to the shovel to get their loads. The owners of the shovel were well pleased with its performance when the job was completed. They undertook the contract, knowing that they were up against an unusual problem, but the results obtained vindicated their judgment in selecting a steam shovel for the work. The city authorities in charge of New Britain's park system also were satisfied with the efficient and speedy fashion in which the material was removed.

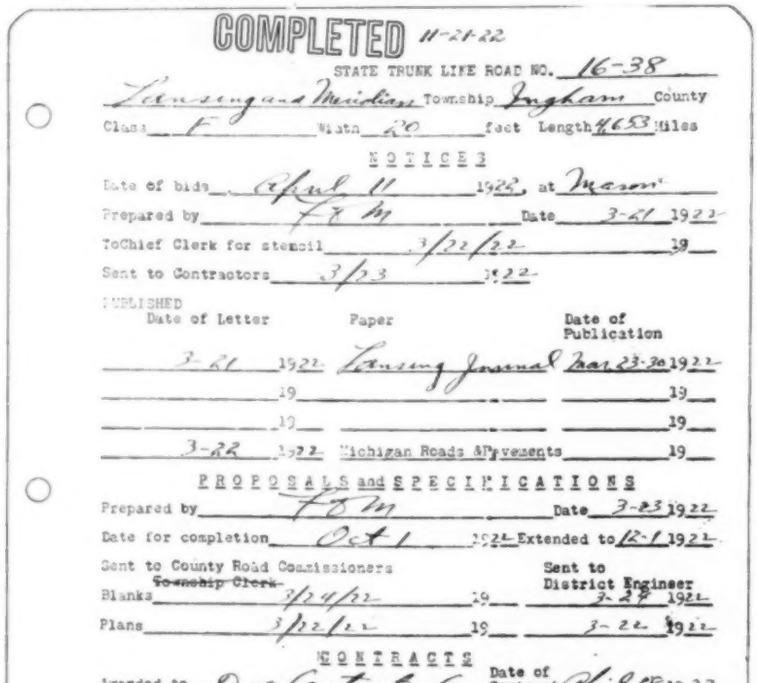
WORKING WITH THE CONTRACTOR

Great Mass of Detail Must be Handled Systematically by State Highway Departments in Order to Keep Jobs Moving Smoothly

By F. D. Messenger

Contract Engineer, Michigan State Highway Department

In advertising for bids and awarding contracts on some 300 separate road projects during the season, it is necessary that the procedure for handling the various items of office work be so systematized as to make the carrying out of the procedure as nearly automatic as possible. For the past few years the Michigan State Highway Department has been advertising for bids and awarding contracts for approximately that number of road projects each season and the handling of each project necessitates the writing of from 25 to 30 letters and from 25 to 30 copies of five or six different forms and the mimeographing and mailing of five to six hundred copies of three different forms, in addition to the sending out of two to five different printed forms and booklets. When it is realized that the advertising of from five to fifteen projects during a single week necessitates the handling of such a large volume of forms, the procedure must be outlined so that some of the forms are not overlooked until too late to be of value to the contractors who are making the bids. The procedure for advertising our projects generally starts each week on Monday and it is necessary, in order to receive bids within a reasonable time, that all except the contract forms be available for distribution before the end of that week.



COMPLETED 11-21-22

STATE TRUNK LINE ROAD NO. 16-38

Lansing and Meridian Township Ingham County

Class F Width 20 feet Length 4.63 Miles

NOTICES

Date of bids April 11 1922, at Noon

Prepared by F E M Date 3-21 1922

To Chief Clerk for stencil 3/22/22 19

Sent to Contractors 3/23 1922

PUBLISHED

Date of Letter	Paper	Date of Publication
3-21 1922	Lansing Journal	Mar 23-30 1922
19		19
19		19
3-22 1922	Michigan Roads & Pavements	19

PROPOSALS and SPECIFICATIONS

Prepared by F E M Date 3-23 1922

Date for completion Oct 1 1922 Extended to 12-1 1922

Sent to	County Road Commissioners	Sent to District Engineer
Blanks	3/24/22 19	3-27 1922
Plans	3/22/22 19	3-22 1922

CONTRACTS

Awarded to Doe Construction Co Date of Contract April 18 1922

Address Ann Arbor, Mich. Amount of Contract $ 99,756.32

Sent to Contractor 4/18 1922 Rec'd & Approved 4/25 1922

Copy sent to contractor 4/29 1922

Certified check returned to contractor 4/29 1922

Bonds executed by Lansing Casualty Co, Lansing, Mich.

Copies to District Engineer 5/1 1922

49,756 bbls. State Cement required @ $2.02 $99,997

Completed cost $ 134,746.52 including cement.

A PAGE FROM THE BOOK BY WHICH THE MICHIGAN HIGHWAY DEPARTMENT KEEPS IN TOUCH WITH ITS PROJECTS

The procedure followed by the department is to outline on a single note book sheet the various steps necessary to accomplish the results mentioned above. These steps are given on the note book sheet in chronological order and the sheet kept available for daily reference by the person in charge of this part of the work so that it is possible for him to follow through the procedure on each project and see that they are carried out to completion in the shortest possible time. This also makes it possible for the person in charge of this work to give preference to certain projects and let the other projects follow in the usual order, as it is many times necessary to receive bids on certain projects within a shorter time than normal.

The copy of this note book sheet which is reproduced on this page, might well be considered somewhat in detail. In the first place, all roads under the supervision of this department are divided into three general classes, State Trunk Line Roads, Federal Aid Roads and Assessment District Roads, and each road in each class is given a number, which number is used throughout the organization and is used as a reference on all correspondence, memorandums and plans. Therefore this road number is the most important information on the sheet. The next line locates the road by county and township, while the third line, by letter, indicates the type of construction and the width and length of the road. This much of the information is, of course, determined far in advance of the time when it is decided to advertise for bids. Therefore as soon as it has been decided to receive bids on any project, this much of the information can be immediately noted on the sheet and at the same time the date for the receipt of bids is decided upon and also the place for the receipt of bids.

With this information, the advertising notice which brings the contractor into the deal, can be prepared and, as soon as it has been typed by a stenographer it is noted on the sheet. When the notice has been approved by the proper official of the department, it is then sent to the chief clerk for stencilling, mimeographing and mailing to contractors and places are provided on the note book sheet for noting the date of these operations. It is also necessary that these notices be sent to newspapers for official publication and the next section of the sheet covers the information as to the papers in which the notice is to be published, the date or dates of publication, and the date on which the letters of transmittal to the newspapers were sent from this office.

The next step in the proceedings is to prepare the proposal forms and the special specifications for that particular job. At the same time the date for completion of the contract is determined and noted on the sheet. It is noted that the first line under this division provides for the initials of the person preparing the proposals and special specifications and the date on which they were prepared. This date is also the date on which these forms go to the chief clerk for stencilling and mimeographing. As soon as the forms are ready for distribution they must be sent to the county road commission in the county where the road is located, if it is a county road, or to the township clerk if it is a township road, and also to the district engineer of the department in whose district the proposed construction is located. In the meantime blue prints of the plans have been ordered from the blue printer and are sent out to the same parties who receive the proposals and special specifications, thus getting this necessary information into the hands of the contractors at the earliest possible moment.

It may be observed from the above outline that it is impossible for any of the forms necessary to become side-tracked and not prepared for distribution as required. Also, this information, when kept easily accessible as a part of the permanent records of the department, is particularly valuable in preparing tables of the number of projects advertised during any particular period and the mileage and type of construction, and gives in a concrete form, the whole history of the proceedings in advertising and receiving bids on each project.

When bids are received, if for any reason they are rejected, the sheet is so stamped and the part under "Contracts" is left blank. If a contract is awarded the name and address of the contractor is noted, the amount of the contract and the date of the contract. The date of the contract in all cases is the date on which it was prepared in this office and in general, will correspond to the date on which it was sent to the contractor. This date is of particular importance in keeping track of the outstanding contracts which have not been signed, and in preparing follow-up letters, if necessary, to obtain the early execution of the contract. The next date given on the sheet is the date on which the contract is received and approved by the State Highway Commissioner, which is followed by the date on which a signed copy of the contract is sent to the contractor. In general, the certified check accompanying the bid is returned to the contractor with his copy of the contract, although in some cases the check is not returned at the same time and therefore an additional line is required for noting the date on which it was returned. At the time the copy of the contract is sent to the contractor the name of the surety on the bonds which accompany the contract is noted. This information is of particular value as many times it is desirable to know the name of this surety and the information can be secured from the blank instead of having to refer to the contract itself which is filed in a special room used for filing purposes only. After the contract has been finally executed, copies are prepared and sent to the department district engineer who has general supervision over the construction and the next line on the sheet gives the date on which these copies are sent out.

In general, on paving projects the cement is furnished under general state contracts and is not included in the bid submitted by the contractor, therefore it is necessary to know the estimated number of barrels of cement necessary for the construction and the amount of money involved for cement so that this amount added to the contract price gives the total amount of funds involved in the contract.

Up until the time blanks and forms are sent out from the main office the sheet is kept in a separate note book, which is known as the advertising book. As soon as this much of the procedure has been taken care of the sheet is filed in a permanent note book corresponding to the road class, that is State Trunk Line Road, Federal Aid Road, or Assessment District Road and the road number. These note books are easily accessible in the office of the contract engineer and the balance of the information given on each sheet is filled out in progressive steps.

The original date for completion is noted under the section pertaining to proposals and specifications and if necessary to extend this date the date of the final extension is noted so that, in all cases, the sheet may be used in determining the last date finally decided upon for completion of the work. When the construction is completed and accepted the sheet is so stamped and the date of acceptance noted and the sheet is then available for use in compiling tables of completed projects the same as has been noted above for compiling tables concerning the projects advertised. This, in connection with the final information noted, namely, the completed cost, completes the history of each particular contract. Incidentally it might be stated that these history books are about the most popular sources of references in the department.

PENNSYLVANIA INVESTS IN MAINTENANCE MATERIALS

IN order to maintain its roads and repair the damage done during the winter months, the Pennsylvania State Highway Department has just let bids for 405,328 tons of stone and 6,274,164 gallons of bituminous material for road treatment. The winter just ended has been exceeding hard on macadam roads.

CUSHIONS AND FILLERS FOR BRICK PAVEMENTS

Expert Answers Questions Asked by Contractor

By James C. Travilla,
Consulting Engineer.

THE following questions were submitted to the editor of Successful Methods by a paving contractor interested in brick pavement construction.

"What is the most practical cushion or bedding course, sand or cement-sand?"

"What is the best method of applying bituminous filler?"

Paving contractors and municipal engineers are not likely to agree as to what may be considered the best practice regarding these problems. Good and indifferent results have been obtained under what may appear as like conditions without giving proper consideration to the human equation, screen analysis of the available sand, weather conditions, etc., entering into the comparison.

The question submitted regarding the cushion or bedding course does not mention granulated slag or limestone screenings. These materials are being specified in a number of places. The writer is of the opinion they are better adapted for the purpose mentioned than those named in the questionnaire, although sand, on account of being easily obtained at moderate cost, has been the material most generally used.

In the early development of brick pavements sand was used for the cushion and filler. For this design of pavement it made little difference in the final results whether the sand was fine, coarse or well graded. With the cement-sand (grout) and bituminous-filled pavements this is not true. A cushion or bedding course of fine loamy sand will tend to work up in the joints, preventing the filler from functioning properly, holds moisture and tends to expand under frost action, resulting in stresses that may cause

LIMESTONE SCREENINGS USED AS CUSHION FOR BRICK PAVEMENT

the pavement to heave and crack. Coarse sand for the cushion or bedding course does not retain moisture, drains readily, and the contour of the pavement is not likely to be affected to the same degree as it would with the use of fine sand. On the other hand, it should not be understood that the quality of sand used in the cushion or bedding course is responsible for all of the cracks that develop in a brick pavement. Contraction cracks are not infrequent.

AN UNUSUAL JOB MADE NECESSARY BY AN UNEXPECTED STORM. THE PHOTOGRAPH SHOWS HOW QUICKLY A LIMESTONE CUSHION HARDENS

A coarse sand will tend to shift and roll much more readily than the fine sand. Fast moving and heavily loaded vehicle traffic tends to displace coarse sand by reason of vibrations in the pavement, often resulting in an uneven bearing for the brick units, finally breaking down the wearing surface in spots. With the coarse sand there is a tendency of the bituminous filler to flow into the voids in the sand, thereby producing a cushion or bedding course that varies in density and bearing power.

In their efforts to improve on these inherent weaknesses in construction resulting from the use of plain sand contractors and engineers developed the cement-sand bed or bedding course, in order that the bed would remain in place thereby assisting to eliminate the construction hazards referred to. Granulated slag and limestone screening for the cushion or bedding course will give results equal if not better than the cement-sand mixture and at a much less cost. Inasmuch as both of these materials have cementing and hardening properties in wet or damp weather, the culling, rolling and surfacing should follow closely upon the laying of the bricks.

APPLYING BITUMINOUS FILLER BY CARRYING IT FROM TANK WAGON IN CONCRETE CARTS

On the job shown in the photograph at the bottom of page 12, limestone screenings are being used. Shortly after the brick had been rolled on this job and before there was time to apply the bituminous filler, a heavy rain storm carried mud over the surface of the brick pavement which partly filled the joint spaces between the brick units. The brick were taken up, cleaned and relaid. The small photograph on this page shows the condition of the limestone bedding course after the brick were removed. Before it was possible to reshape the cushion or bedding course it was necessary to use a mattock to break the bond caused by its cementing value. The paving brick job described was under the direction of W. W. Horner, Chief Engineer, Paving and Sewers, St. Louis.

Applying Bituminous Filler

The method most commonly adopted for applying bituminous fillers is to convey the liquid material from heating kettle in coal hods and work it into the joint spaces with rubber squeegees.

Squeegee carts are frequently used. They have a small tank for holding the liquid bitumen to which there is attached a discharge opening controlled by an iron rod attached to the handle of the cart to permit the operator to regulate the amount discharged in front of a rubber squeegee. This method of applying bitumen gives more uniform results as compared to the method described first.

The photograph at the bottom of the previous page shows small cement concrete carts being used for conveying the liquid bitumen from the heating kettle and rubber squeegees for working it into the air spaces.

The contractor-reader of SUCCESSFUL METHODS might well have been asked another interesting question regarding brick pavement construction over which there has been some difference of opinion. The question relates to the need of definite and positive joint spaces to admit the filler to flow to the bottom of the joints and to function properly. Contractors and engineers generally admit that the functions of the bituminous filler are to protect the edges of the brick, waterproof the cushion or bedding course and to compensate for temperature stresses that develop in the pavement. A bituminous carpet or mat that is formed in applying the filler is of secondary importance, because at best it will last but a short time under heavy traffic.

Repress and wire-cut lug brick are made with small projections which automatically provide joint spacing.

NEW YORK CHANGES CONCRETE ROAD SPECIFICATIONS

THE State of New York has just adopted new specifications for concrete pavements. Frederick S. Greene, recently reappointed highway commissioner, describes the advantages of the new specifications as follows:

"(1) We have done away with the crown sub-base, which as you know, is exceedingly difficult to roll and which I do not believe has ever been a practical proposition for the contractor.

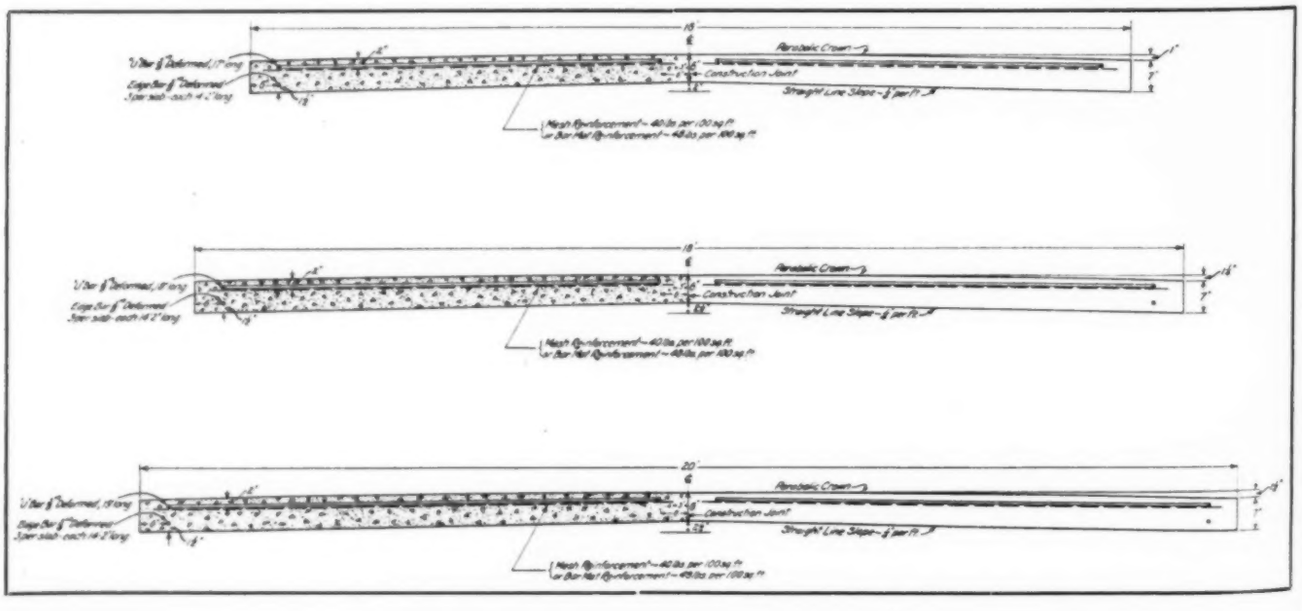
"(2) We have increased the thickness of the slab at the outer extremities, where the greatest strain comes when two heavily loaded trucks pass each other on the pavement.

"(3) We have continued the parabolic crown for the outer surface so as to do away with the short angle at the center joint which two flat planes would give.

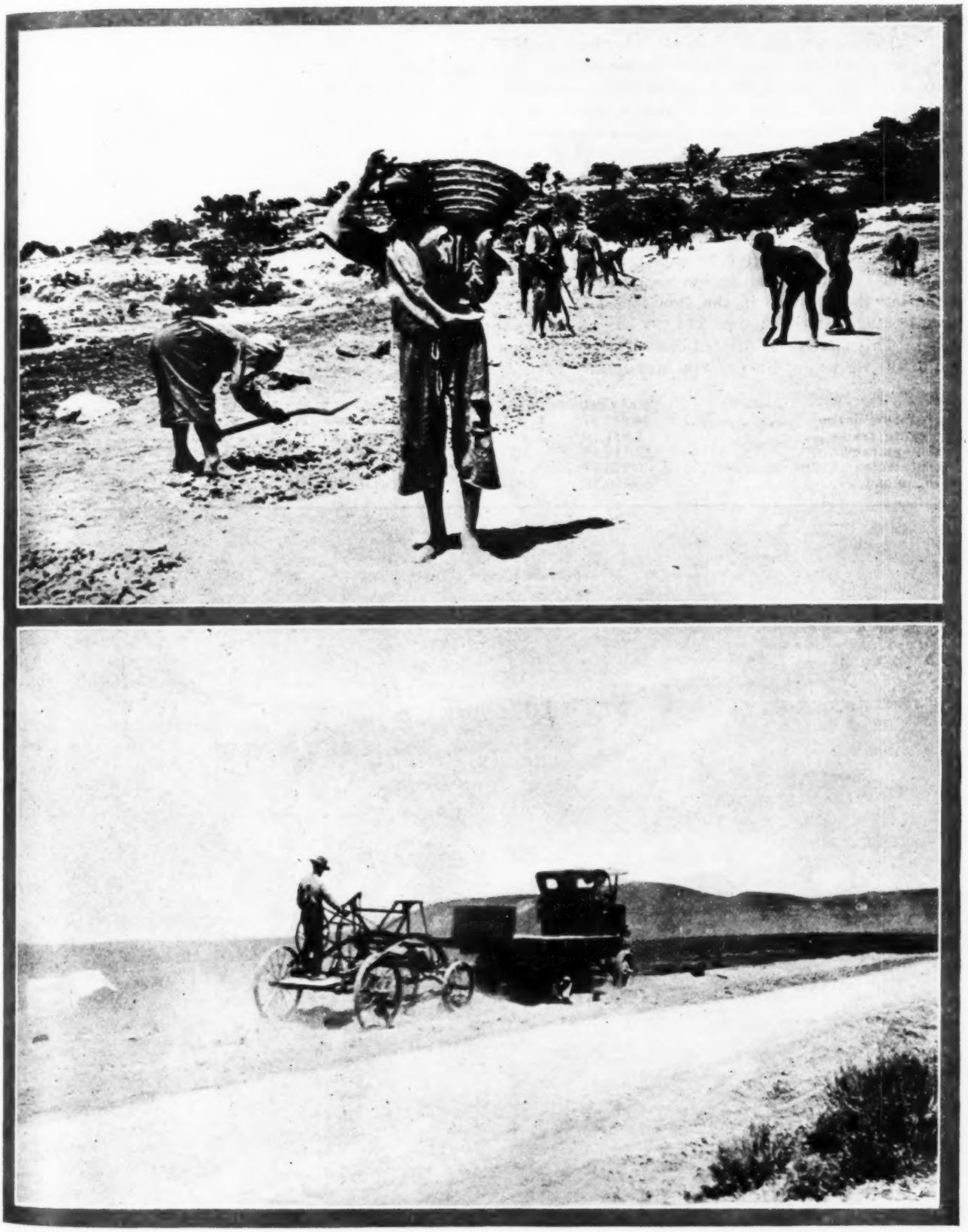
"(4) We have cut down on the weight of the reinforcement mesh, using now but 40 lb. per 100 sq. ft. We also give the contractor the option between mesh and assembled bar mats.

"(5) In addition to U bars at the expansion joints, we are running longitudinal bars 6 in. from the outer edge of the slab. We are going to place expansion joints at 40-ft. intervals."

Cross sections of the new slab appear below:



Road Maintenance Ancient and Modern



Hand labor of the most primitive type is still in vogue on the road between Jerusalem and Jericho. It is in sharp contrast to the modern way of maintaining roads shown in the lower photograph which shows a truck pulling a blade grader on a Wyoming highway. © *International.*

COST FIGURES ON BIG PROJECT

Builders of Don Pedro Dam in California Know Where Their Money Goes

By R. V. Meikle, Chief Engineer

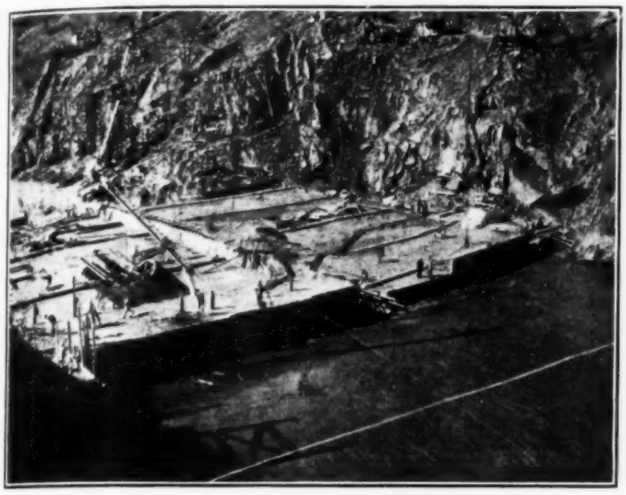
THE Turlock and Modesto Irrigation Districts in California which were formed as far back as 1887 have just completed a new dam known as the Don Pedro Dam. It is a concrete structure of the solid gravity type and will extend the irrigation season in the two districts affected by two months. Previously the season has been from March to August and with the addition of the supply from the Don Pedro Dam the season will be extended to October.

The estimated cost of the completed project, including the dam power plant, railroad, etc., is $4,730,809, and it is always interesting to analyze figures of this magnitude. Such an analysis has been made of the cost of placing the concrete in the Don Pedro Dam up to Sept. 18, 1922, at which time 213,199 cu. yd. had been placed. This analysis is printed below for the information of the readers of Successful Methods.

	Total Cost	Cost per Yard
Aggregate storage	$4,647.97	$ .02
Aggregate trains	3,381.16	.02
Cement storage	17,112.48	.08
Cement trains	775.77	..
Train unload	6,190.15	.03
Mixer crew	$8,589.51	$ .04
Concrete trains	1,720.96	.01
Dump trains	1,099.23	.01
Placing crew	15,284.54	.07
Chute tenders	13,844.07	.07
Form makers	14,641.40	.07
Deliver forms	6,371.03	.03
Set forms	15,066.00	.07
Stripping forms	10,848.48	.05
Curing concrete	1,079.21	..
Remove laitance	11,708.13	.05
Labor	132,360.09	.62
Repairs labor	14,499.97	.07
Repairs material	11,138.16	.05
Cement	3,173.79	3.16
Aggregate	277,867.19	1.30
Unload aggregate	1,606.83	.01
Form material	22,739.62	.11
Oil, gas, etc	2,639.23	.01
Power	3,130.75	.01
Incidentals	4,291.88	.02
Overhead, equipment construction and camp, water and sewage systems and general camp maintenance	270,762.73	1.27
Totals	$1,414,209.82	$6.63

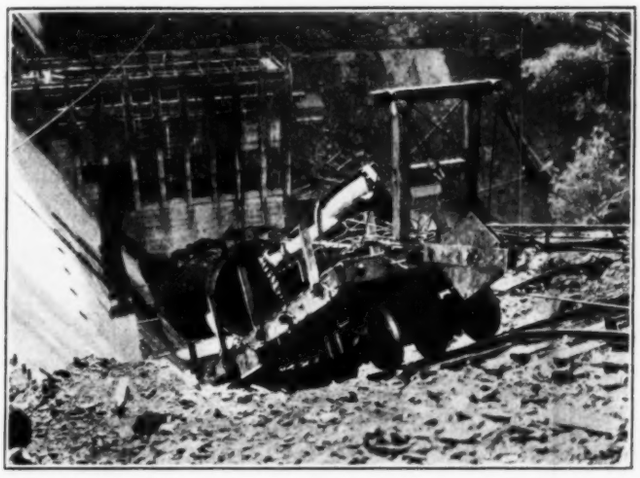
A GENERAL VIEW OF THE FOUNDATION OF THE DON PEDRO DAM TAKEN IN SEPTEMBER, 1921

Since these figures were prepared last fall the average cost of placing the concrete naturally has increased because of the smaller amount which it was possible to pour as the job neared completion. The final figure on the average cost per yard is $6.66.



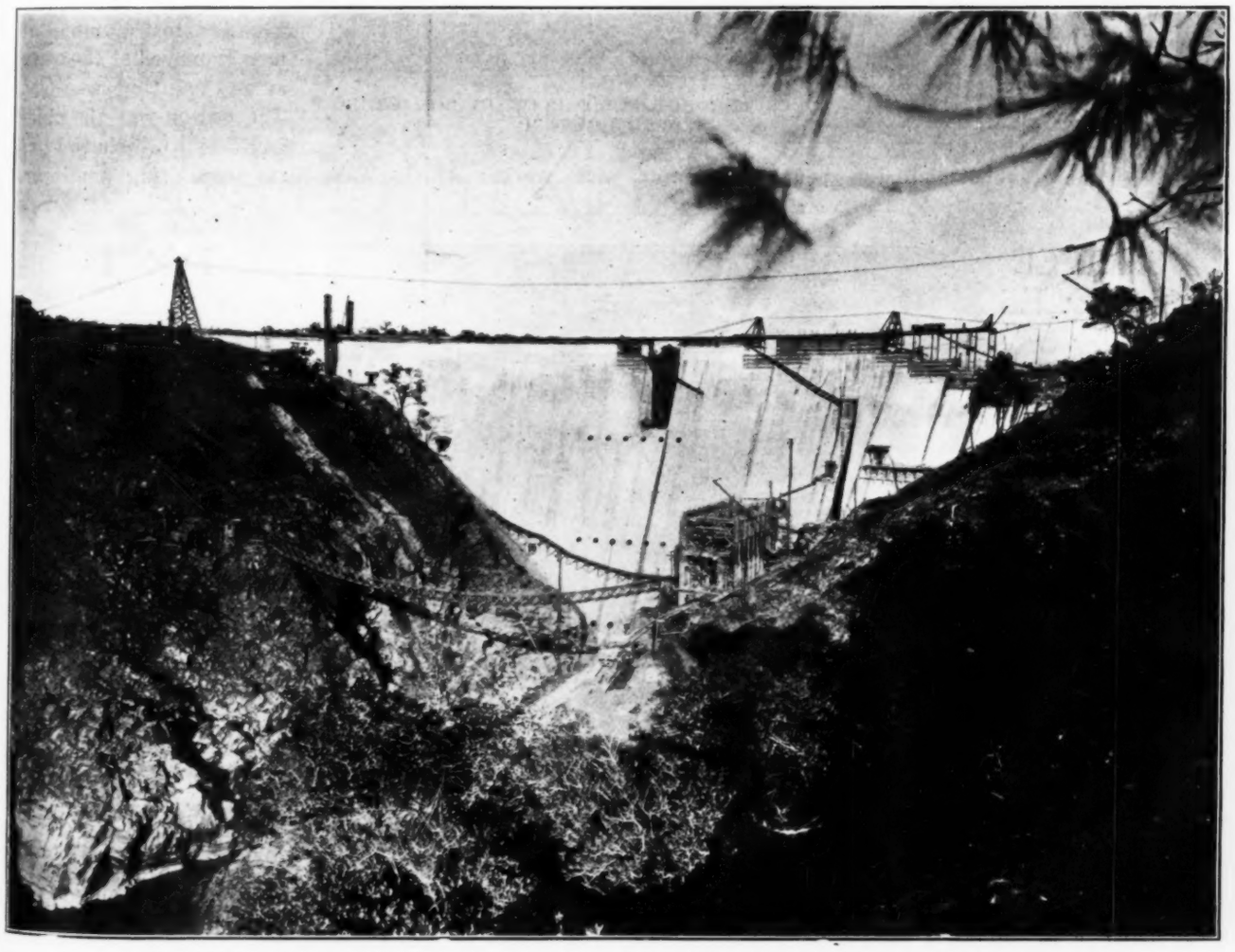
AT WORK DURING A FLOOD PERIOD IN FEBRUARY, 1922

The dam is 1000 ft. in length on top, 75 ft. in length at the base and 283 ft. high. Its thickness at the top is 16 ft. and at the base 177 ft. The capacity of the reservoir will be 289,000 acre ft.



LOWERING TURBINE SECTIONS FOR THE POWER HOUSE

The entire job was handled by the Turlock and Modesto Irrigation Districts and most of the work was done by force account. Accurate records were kept on the results obtained. For example, in constructing the dam two 2-yd. mixers were used yielding per batch 2⅛ yd., the aggregates being proportioned by measuring in



THE DAM NEARING COMPLETION. THIS PHOTOGRAPH WAS TAKEN IN NOVEMBER, 1922

divided bottom hopper cars, and the cement was added at the mixers. The time of mix was 1½ min. per complete batch and the maximum day's run on an 8-hr. shift was 1320 yd. The average output per month for five months was 29,000 yd.

The regular mix of the concrete was 1 part cement, 3 parts sand, 6 parts gravel and 3 parts cobbles, but a 1:2:4 mix was used on the lower part of the dam in places where the dam is more than 200 ft. high. Daily samples of the mixer output were tested in order to keep accurate track of the strength. The cost of the same, gravel and cobbles, was $1.28 per yd. in the concrete at the dam, including both overhead and depreciation, although the total haul from the gravel plant in Stanislaus River to the dam was 40 miles.

DRAFT TUBES THROUGH SOLID ROCK IN DON PEDRO POWER HOUSE

At the gravel plant a steam dragline was used to excavate the gravel, which was then screened and removed from the pit in 4-yd. narrow-gage dump cars. There were 24 of these cars. In taking the material to the dam, bottom dump gondolas were used. The capacity of the gravel plant was limited to 2000 tons daily.

The cement averaged .89 bbls. per cu. yd. of concrete and the cost per barrel f.o.b. Don Pedro was $3.62.

Work on the dam began in June, 1921, when the camp was started, although considerable primary work had been done in the construction of the 12-mi. standard-gage railroad with 70-lb. rails which was necessary to carry on the job. The diversion of the river was begun in August, 1921, and the dam was completed about the beginning of this year. The greatest number of men employed at the camp at any one time was 500. The writer was the chief engineer in charge of the work. A. J. Wiley was consulting engineer.

SHOVEL HANDLES STONE SKIP

THE adaptability of a steam shovel for various uses is shown in the photograph on the right which was taken on an excavation job on Fifth Avenue, New York City. The shovel which is owned by the George J. Atwell Co., Inc., is shown handling a stone skip. The dipper stick and dipper have been removed which enables the shovel to operate as a crane. This particular shovel was handling some pretty heavy loads.

As the picture shows, part of the excavation was in solid rock which had to be blasted out and the fragments pulled out and loaded on trucks.

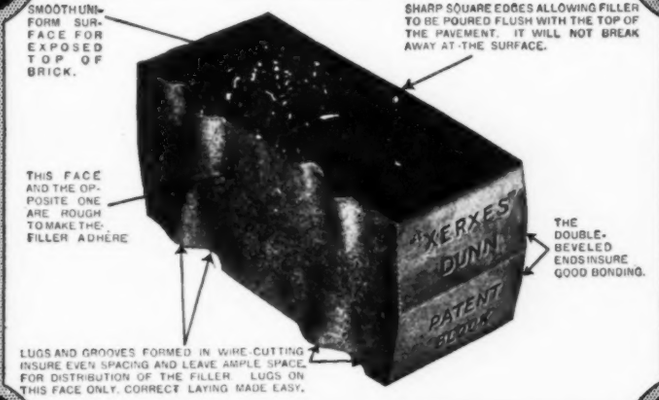
DON'T NEGLECT YOUR MACHINE

THIS is the time of the year when a good deal of construction machinery is being brought out of winter quarters and put to work on new jobs. Every contractor who is planning to use a machine which has not been in service since it was put away last fall should devote considerable time and attention to a thorough inspection and overhauling of the equipment before it leaves the yard for the job.

As soon as it is at work, any breakdown is costly and each minute lost can be measured in dollars and cents and in a corresponding decrease in the estimated profits.

WIRE-CUT LUG BRICK

A Wire-Cut Lug Hillside Brick



End View—Two Wire-Cut Lug Brick—Note joint spacing

ONE BILLION SIXTY-FOUR MILLION NOW IN SERVICE

IN STREETS AND HIGHWAYS THROUGHOUT THE UNITED STATES AND CANADA

Scientifically designed to meet the requirements of exacting engineers.

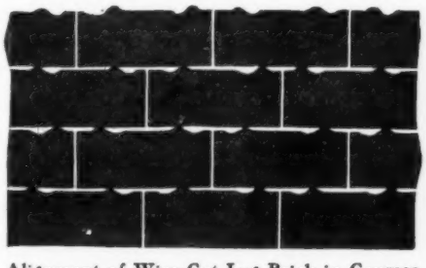
Costs no more per square yard than ordinary brick.

Made in all standard sizes by reputable and progressive manufacturers everywhere.

THE
SOUTHERN CONSTRUCTION CO.
CHATTANOOGA, TENN.

SAYS:

"WE have laid several millions of wire-cut lug bricks and have a high opinion of them. Our experience has demonstrated that it is possible to get a better bond, a more even surface and a stronger pavement with wire-cut lug brick than with other brick."



Alignment of Wire-Cut Lug Brick in Courses, Showing Uniform Spacing for Filler.

Uniform spacing requires wire-cut lug brick. This is imperative with either bituminous or cement filler.

A wire-cut lug brick pavement is the pride of its builder.

Ask for list of competing manufacturers in your territory.

THE DUNN WIRE-CUT LUG BRICK CO.

LICENSORS CONNEAUT, O.

Engineering Service To Buyers For Export

MANY of the manufacturers of engineering machinery whose announcements appear in this publication handle their export business through a common department—the Allied Machinery Company of America.

The Allied Machinery Company of America maintains branch offices and connections throughout the world at the addresses given below.

At each address there are located engineers capable of advising in regard to the most modern American construction and material-handling methods and machinery.

This advisory engineering service is at your disposal. It is supplemented by an organization thoroughly experienced in shipping heavy machinery to all parts of the world.

Allied Machinery Company of America

Cable Address: ALMACOA

51 CHAMBERS STREET—NEW YORK

BRANCH OFFICES:

ARGENTINA—Buenos Aires, Venezuela, 691. Cable Address: ALMACOA.

BELGIUM—Brussels Allied Machinery Company of America, Rue de la Montagne 52. Cable Address: ALMACOA.

CHILE—Santiago, Allied Machinery Company of America, Edificio Ariztia, Calle New York, Esquina de la Bolsa, Piso No. 9. Cable Address: ALMACOA.

CHINA—Shanghai, Allied Machinery Company of America, 15 Foochow Road. Cable Address: ALMACOA.

CUBA—Havana, Allied Machinery Company of America, Obrapia 23. Cable Address: ALMACOA.

ENGLAND—London, Allied Machinery Company, Limited, 70 Victoria St., S. W. 1. Cable Address: ALYDMACHIN.

FEDERATED MALAY STATES—STRAITS SETTLEMENTS and SIAM—United Engineers, Ltd., P. O. Box 613, Singapore. Cable Address: UNITEERS.

FRANCE—Paris, Allied Machinery Company de France, 19 Rue de Rocroy. Cable Address: ALMACOA.

ITALY—Turin, Allied Machinery Company d'Italia, Corso Dante 40. Cable Address: ALMACOA.

JAPAN—Tokyo, Horne Company, Ltd., 6-7 Takiyama-Cho Kyobashi-Ku. Cable Address: HORNE.

MEXICO—Mexico City, D. F. Joaquin M. de Uriarte 3a Palma 34. Cable Address: ALMACOA.

PERU—Lima, Allied Machinery Company of America, Calle Filipinas 559. Cable address: ALMACOA.

PORTO RICO—San Juan, Earl K. Burton, Inc., P. O. Box 1367. Cable Address: EKBURT.

PORTUGAL—Lisbon, Monteiro Gomes Ltda. Rua de Alecrim. Cable Address: TRACTORES.

SPAIN—Barcelona, Allied Machinery Company, S. A. E., Consejo de Ciento 318. Cable Address: ALMACOA.

SWITZERLAND—Zurich, Allied Machinery Company of America, Loewenstrasse 16. Cable Address: ALMACOA.

TRINIDAD—Port of Spain, Hardware and Electric Supplies, Ltd., 4 Frederick S. C. Cable Address: HARDWARES.

Joint Sales Service In New York City Territory

THE Allied Machinery Company of America has taken over the management of the sales in New York City and vicinity of the following companies:

CLYDE IRON WORKS SALES COMPANY
Duluth, Minn.

AUSTIN-WESTERN ROAD MACHINERY CO.
Chicago, Ill.

AUSTIN MANUFACTURING COMPANY
Chicago, Ill.

THE LAKEWOOD ENGINEERING COMPANY
Cleveland, Ohio

THE UNIVERSAL CRANE COMPANY
Elyria, Ohio

The Allied Machinery Company will follow the same methods which it has used in building up all over the world the business of these and other important American manufacturers of construction machinery and equipment.

Men from the factories of the above manufacturers will be resident in New York City to give customers expert service.

Stocks of the machinery and equipment made by these manufacturers will be maintained in New York City to insure prompt deliveries. Repairs also will be carried in stock so that customers may obtain immediate replacements.

Offices will be continued at the Allied Construction Machinery Centre, 139-149 Centre St., New York City, where these manufacturers and several others have for some years maintained the largest permanent exhibit of this kind of machinery and equipment ever undertaken.

Allied Machinery Company of America

Domestic Sales Offices

139-149 CENTRE STREET, NEW YORK CITY